

**WE CLAIM:**

1. An antistatic composition comprising one or more solvents,  
at least 50 volume % being organic solvent(s), and a fluorochemical that is a  
5 reaction product of  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with an amine wherein  $R_f$  comprises 4 or  
more fully fluorinated carbon atoms.
2. The antistatic composition of claim 1 wherein said amine  
comprises one or more aliphatic amino groups, is non-fluorinated, and has a  
10 molecular weight of from about 31 to about 2000 and  $R_f$  comprises 4 or more  
even-numbered fully fluorinated carbon atoms.
3. The antistatic composition of claim 1 wherein  $R_f$  comprises  
a fluoroaliphatic chain comprising one or more straight-chain, branched-chain, or  
15 cyclic aliphatic chains or combinations thereof that are joined together by  
heteroatoms or heteroatom-containing groups.
4. The antistatic composition of claim 2 wherein  $R_f$  comprises  
a single fluoroalkyl chain comprising 6, 8, 10, 12, 14, or 16 fully fluorinated  
20 carbon atoms.
5. The antistatic composition of claim 2 wherein  $R_f$  comprises  
a single fully fluorinated fluoroalkyl chain comprising 6, 8, or 10 carbon atoms.
- 25 6. The antistatic composition of claim 2 comprising first and  
second fluorochemicals wherein said first fluorochemical is a reaction product of  
 $R_{fa}\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with an aliphatic amine wherein  $R_{fa}$  comprises 4 or more even-  
numbered fully fluorinated carbon atoms, and said second fluorochemical is a  
reaction product of  $R_{fb}\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with the same or different aliphatic amine  
30 wherein  $R_{fb}$  comprises 4 or more even-numbered fully fluorinated carbon atoms.

7. The antistatic composition of claim 2 comprising first and second fluorochemicals wherein said first fluorochemical is a reaction product of  $R_{fa}-CH_2CH_2-SO_3H$  with an aliphatic amine wherein  $R_{fa}$  comprises 6 fully fluorinated carbon atoms, and said second fluorochemical is a reaction product of  $R_{fb}-CH_2CH_2-SO_3H$  with the same or different aliphatic amine wherein  $R_{fb}$  comprises 8 or 10 fully fluorinated carbon atoms.
8. The antistatic composition of claim 1 wherein said amine is an aliphatic amine and comprises one or more straight-chain, branched-chain, or cyclic aliphatic groups, or a combination of such groups that are joined together by heteroatoms or heteroatom-containing groups.
9. The antistatic composition of claim 1 wherein said aliphatic amine comprises two amino groups.
10. The antistatic composition of claim 2 wherein said aliphatic amine is a polyoxyalkylenediamine.
11. The antistatic composition of claim 2 wherein said aliphatic amine is polyoxyalkyleneamine, polyoxypropylenediamine, propoxylated{poly(oxypropylene)} diamine, alkylethertriamine, or ethoxylated tallow alkylamine, and  $R_f$  is  $C_6F_{13}-$ .
12. The antistatic composition of claim 2 further comprising one or more hydrophobic binders.
13. The antistatic composition of claim 12 wherein at least one of said hydrophobic binders is a cellulose acetate butyrate binder.

14. A thermally developable material comprising a support and having thereon at least one thermally developable layer, and a first conductive layer comprising a fluorochemical that is a reaction product of  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with an amine wherein  $R_f$  comprises 4 or more fully fluorinated carbon atoms.

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15. The thermally developable material of claim 14 wherein said amine comprises one or more amino groups, is non-fluorinated, and has a molecular weight of from about 31 to about 2000 and  $R_f$  comprises 4 or more even-numbered fully fluorinated carbon atoms.

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16. The thermally developable material of claim 14 wherein  $R_f$  comprises a fluoroaliphatic chain comprising one or more straight-chain, branched-chain, or cyclic aliphatic chains or combinations thereof that are joined together by heteroatoms or heteroatom-containing groups.

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17. The thermally developable material of claim 15 wherein  $R_f$  comprises a single fluoroalkyl chains comprising 6, 8, 10, 12, 14, or 16 fully fluorinated carbon atoms.

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18. The thermally developable material of claim 15 wherein  $R_f$  comprises a single fully fluorinated fluoroalkyl chain comprising 6, 8, or 10 carbon atoms.

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19. The thermally developable material of claim 15 wherein said first conductive layer comprises first and second fluorochemicals wherein said first fluorochemical is a reaction product of  $R_{fa}\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with an amine wherein  $R_{fa}$  comprises 6 fully fluorinated carbon atoms, and said second fluorochemical is a reaction product of  $R_{fb}\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with the same or different amine wherein  $R_{fb}$  comprises 8 or 10 fully fluorinated carbon atoms.

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20. The thermally developable material of claim 19 wherein said first fluorochemical is present in said first conductive layer in an amount of from about 50 to about 95 weight % based on total fluorochemical weight.

5 21. The thermally developable material of claim 15 wherein said aliphatic amine comprises one or more straight-chain, branched-chain, or cyclic aliphatic groups, or a combination of such groups that thereof that are joined together by heteroatoms or heteroatom-containing groups.

10 22. The thermally developable material of claim 15 wherein said aliphatic amine is a polyoxyalkylenediamine.

23. The thermally developable material of claim 15 wherein said first conductive layer comprises one or more fluorochemicals, each  
15 fluorochemical being a reaction product of  $R_f-CH_2CH_2-SO_3H$  with a non-fluorinated polyoxyalkyleneamine comprising two or more amino groups and having a molecular weight of from about 17 to about 2000, and each  $R_f$  is the same or different fully fluorinated fluoroalkyl group having 6, 8, or 10 carbon atoms.

20 24. The thermally developable material of claim 23 wherein said aliphatic amine is polyoxyalkyleneamine, polyoxypropylenediamine, propoxylated{poly(oxypropylene)}diamine, alkylethertriamine, or ethoxylated tallow alkylamine, and at least one  $R_f$  is  $C_6F_{13}-$ .

25 25. The thermally developable material of claim 15 wherein said first conductive layer further comprises one or more hydrophobic binders.

26. The thermally developable material of claim 25 wherein at  
30 least one of said hydrophobic binders is a cellulose acetate butyrate binder.

27. The thermally developable material of claim 15 wherein said first conductive layer is disposed over said thermally developable layer on the same side of said support.

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28. The thermally developable material of claim 15 comprising a second conductive layer on the opposite side of said support as said first conductive layer, said first and second conductive layers containing the same or different reaction product fluorochemical that is a reaction product of  
10  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with an aliphatic amine wherein  $R_f$  comprises 4 or more even-numbered fully fluorinated carbon atoms.

29. The thermally developable material of claim 15 that is a non-photosensitive thermographic material comprising a non-photosensitive  
15 source of reducible silver ions and a reducing composition for said non-photosensitive source of reducible silver ions.

30. A black-and-white thermographic material that comprises a support having thereon one or more thermally-developable imaging layers  
20 comprising a binder and in reactive association, a non-photosensitive source of reducible silver ions, and a reducing composition for said non-photosensitive source of reducible silver ions, and

a first conductive layer comprising a fluorochemical that is a reaction product of  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with an aliphatic amine wherein  $R_f$   
25 comprises 4 or more even-numbered fully fluorinated carbon atoms.

31. A photothermographic material that comprises a support having thereon one or more thermally developable imaging layers comprising a binder and in reactive association, a photosensitive silver halide, a non-photo-

sensitive source of reducible silver ions, a reducing composition for said non-photosensitive source reducible silver ions, and

5 a first conductive layer comprising a fluorochemical that is a reaction product of  $R_f-CH_2CH_2-SO_3H$  with an amine wherein  $R_f$  comprises 4 or more even-numbered fully fluorinated carbon atoms.

32. The photothermographic material of claim 31 wherein said amine comprises one or more amino groups, is non-fluorinated, and has a molecular weight of from about 31 to about 2000.

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33. The photothermographic material of claim 32 wherein said first conductive layer is disposed on said support opposite said one or more thermally developable imaging layers.

15 34. The photothermographic material of claim 32 wherein said non-photosensitive source of reducible silver ions is a silver fatty acid carboxylate having 10 to 30 carbon atoms in the fatty acid or a mixture of said silver carboxylates.

20 35. The photothermographic material of claim 32 wherein said support is composed of a transparent polyester and said first conductive layer further comprises a cellulose ester binder.

25 36. The photothermographic material of claim 35 wherein the weight ratio of fluorochemical to cellulose ester binder in said first conductive layer is from about 0.04:1 to about 0.2:1.

30 37. The photothermographic material of claim 32 further comprising a protective layer over said one or more thermally-developable imaging layers, an antihalation layer on the backside of said support, or both.

38. The photothermographic material of claim 32 wherein said support is composed of a transparent polyester film, said photosensitive silver halide is a photosensitive silver bromide, silver bromoiodide, or both, said non-photosensitive source of reducible silver ions is a silver salt of an aliphatic carboxylic acid, or a mixture of such salts, at least one of which is silver behenate, said reducing composition for said non-photosensitive source reducible comprises a hindered phenol, and

on one or both sides of said support, the same or different conductive layers each comprising a cellulose acetate butyrate binder, and the same or different fluorochemical that is a reaction product of  $R_f-CH_2CH_2-SO_3H$  with a non-fluorinated polyoxyalkyleneamine comprising two or more amino groups and having a molecular weight of from about 31 to about 2000, and each  $R_f$  is the same or different fully fluorinated fluoroalkyl group having 6, 8, or 10 carbon atoms.

39. The photothermographic material of claim 27 that provides a black-and-white image.

40. A black-and-white photothermographic material that comprises a support having thereon:

a) one or more thermally developable imaging layers each comprising a binder, and in reactive association,

a photosensitive silver bromide or silver iodobromide,

a non-photosensitive source of reducible silver ions that includes one or more silver carboxylates at least one of which is silver behenate,

a reducing composition for said non-photosensitive source reducible silver ions that includes at least one hindered phenol, and

at least one toner, antifoggant, spectral sensitizing dye, or high contrast agent, or any combination thereof,

- b) a protective overcoat disposed over said one or more thermally developable imaging layers,
- c) on the backside, a first conductive layer comprising a fluorochemical that is a reaction product of  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with a polyoxyalkylenediamine wherein  $R_f$  comprises a single fully fluorinated fluoroalkyl chain comprising 6, 8, or 10 carbon atoms, or a mixture of two or more fluorochemicals that are reaction products of the same or different  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with the same or different polyoxyalkylenediamine, and
- d) also on said backside, an antihalation layer disposed over said first conductive layer.

41. A black-and-white thermographic material that comprises a support having thereon:
- a) one or more thermally developable imaging layers each comprising a binder, and in reactive association,
    - a non-photosensitive source of reducible silver ions that includes one or more silver carboxylates at least one of which is silver behenate,
    - a reducing composition for said non-photosensitive source reducible silver ions that includes at least one di- or tri-hydroxy compound having at least two hydroxy groups in *ortho*- or *para*-relationship on the same aromatic nucleus,
    - at least one toner, antifoggant, or high contrast agent, or any combination thereof,
  - b) a protective overcoat disposed over said one or more thermally developable imaging layers, and
  - c) on the backside, a first conductive layer comprising a fluorochemical that is a reaction product of  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with a polyoxyalkylenediamine wherein  $R_f$  comprises a single fully fluorinated fluoroalkyl chain comprising 6, 8, or 10 carbon atoms, or a mixture of two or



more fluorochemicals that are reaction products of the same or different  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  with the same or different polyoxyalkylenediamine.

42. A method of forming a visible image comprising:

5           A) thermal imaging of the thermally developable material of claim 15.

43. The method of claim 42 wherein said thermographic material comprises a transparent support, and said image-forming method further comprises:

10           B) positioning said thermal imaged thermographic material between a source of imaging radiation and an imageable material that is sensitive to the imaging radiation, and

              C) exposing said imageable material to the imaging radiation through the visible image in said thermal imaged thermographic material to provide an  
15 image in the imageable material.

44. A method of forming a visible image comprising:

              A) imagewise exposing the photothermographic material of claim 32 to electromagnetic radiation to form a latent image,

20           B) simultaneously or sequentially, heating said exposed photothermographic material to develop said latent image into a visible image.

45. The method of claim 44 wherein said photothermographic material comprises a transparent support, and said image-forming method further  
25 comprises:

              C) positioning said exposed and heat-developed photothermographic material with the visible image therein between a source of imaging radiation and an imageable material that is sensitive to said imaging radiation, and

D) exposing said imageable material to said imaging radiation through the visible image in said exposed and heat-developed photothermographic material to provide an image in said imageable material.

5                    46.     A method of preparing an antistatic composition comprising dispersing  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  wherein  $R_f$  comprises 4 or more even-numbered fully fluorinated carbon atoms and an amine in one or more solvents, at least 50 volume % being organic solvent(s), said one or more solvents further comprising one or more hydrophobic binders, and reacting said amine and  
10      $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  to provide a fluorochemical in an antistatic composition.

                    47.     A method of coating an antistatic composition comprising: dispersing  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  wherein  $R_f$  comprises 4 or more even-numbered fully fluorinated carbon atoms and an amine in one or more solvents, at  
15     least 50 volume % being organic solvent(s), said one or more solvents further comprising one or more hydrophobic binders, and reacting said amine and  $R_f\text{-CH}_2\text{CH}_2\text{-SO}_3\text{H}$  to provide a fluorochemical in an antistatic composition, and without isolation or purification of said fluorochemical, applying said antistatic composition to a substrate.